DESCRIPTION

PAPER FOR INK JET AND ELECTROPHOTOGRAPHIC RECORDING

Technical Field

The present invention relates to a paper for ink jet and electrophotographic recording usable for both the ink jet recording method and the electrophotographic recording method. More particularly, it relates to a paper for ink jet and electrophotographic recording which is a recording paper of so-called plain paper type having no special coating on the recording surface, and, especially, which is excellent in water resistance of images recorded thereon with a water-soluble ink by ink jet recording method and excellent in toner transferability and running property in color recording by electrophotographic recording method.

Background Art

According to the ink jet recording method, an ink is directly jetted onto a recording paper, and this method attracts attention as a recording method because it is low in running cost, little in noise and easy in color recording. In this recording method, water-soluble inks are used from the points of safety and printability, and recording papers used for this

recording method are required to have the following properties, namely, the ink is quickly absorbed in the recording papers and when inks of different color overlap each other on the recording papers, the inks do not flow together; spread of ink dot ejected on the recording paper is proper; the shape of the dot is close to right circle; the dot edge is sharp; dot density is high; and the recording papers have sufficiently high whiteness for enhancement of dot contrast.

As recording papers used for ink jet recording methods, JP-A-59-35977 and JP-A-1-135682 proposed coated papers exclusively used for the methods in order to meet the above requirements. On the other hand, in the fields of monochromatic recording and business color recording, inexpensive and general-purpose recording papers, namely, plain papers generally used in electrophotographic recording methods are desired.

Hitherto, when recording papers used in electrophotographic recording apparatuses are used in ink jet recording methods, there are problems that because of their poor absorbability of ink, if a large amount of ink is applied, the ink flows on the paper, and, furthermore, even if the ink absorbability is sufficient, the ink is absorbed along the fibers of the paper to cause a phenomenon of the shape of ink dots becoming indefinite (feathering).

Recently, paper for ink jet and electrophotographic recording usable for both the ink

jet recording and electrophotographic recording are put on the market, but the problem in the water resistance of the resulting images which is the most serious in ink jet recording method has not yet been solved.

In order to obtain the water resistance of images in the ink jet recording, it is effective to contain a cationic resin in the recording paper thereby to make water-resistant the dye due to the reaction between anionic site of the ink dye and the resin. However, owing to the presence of the cationic resin which is an electrolyte, surface resistivity of the recording paper decreases, resulting in deterioration of transferability of toners in the electrophotographic recording method. Decrease of the surface resistivity is preferred for running property of the recording papers, but this greatly affects the toner transferability especially in the electrophotographic recording method of full color type.

As aforementioned, water resistance of ink has not yet been obtained for ink paper for ink jet and electrophotographic recording of plain paper type. The object of the present invention is to provide a paper for ink jet and electrophotographic recording of plain paper type which is excellent in water resistance of images recorded thereon by ink jet recording method and excellent in toner transferability and running property in color recording by electrophotographic recording method.

Disclosure of Invention

As a result of intensive research conducted by the inventors, they have accomplished a paper for ink jet and electrophotographic recording which is excellent in water resistance of images recorded thereon by ink jet recording method and excellent in toner transferability and running property in color recording by electrophotographic recording method.

That is, the present invention relates to a paper for ink jet and electrophotographic recording usable for both the recordings which comprises a support having a cationic resin adhered thereto in a dry adhering amount of 0.5-2.0 g/m^2 and which has a surface resistivity of $1.0 \times 10^9 - 9.9 \times 10^{13}$ Ω.

Cation equivalent of the cationic resin measured by colloidal titration method is preferably 3-8 meq/g.

The support preferably contains a neutral rosin sizing agent or an alkenyl succinic anhydride as an internal sizing agent.

Furthermore, the support may contain a waste paper pulp.

Best Mode for Carrying Out the Invention

The ink jet recording sheet of the present invention will be explained in detail below.

In order to improve water resistance of images formed of a water-soluble ink containing a direct dye or

an acid dye used in ink jet recording method, it is obvious that fixation and water resisting treatment of the dye by a reaction between the anionic site of the dye and a cationic material are effective.

Therefore, in the paper for ink jet and electrophotographic recording, it is also attempted to obtain water resistance of ink jet recorded images by adding a cationic resin. However, when a large amount of a cationic resin is contained in recording papers, this causes deterioration of transferability of toners to the recording papers in the case of color recording by electrophotographic recording method, resulting in problems such as formation of voids in the images and deterioration of image density.

As a result of investigation on the causes for the above-mentioned phenomena, it has been found that surface resistivity of the recording paper lowers due to the cationic resin as an electrolyte contained in a large amount, resulting in deterioration of transferability of toners to the surface of recording paper. This phenomenon is especially conspicuous in electrophotographic recording of full-color type, and the effect is small for the first transferred color toner, but the transferability of the second and subsequent toners is considerably deteriorated. A cause for this phenomenon is considered that if the surface resistivity of the recording paper is too low, the first transferred toner leaks electric charge on the recording paper to

seriously damage the chargeability and the subsequent transferability of toners to the recording paper is deteriorated.

The inventors have conducted an intensive study on the above problems, and, as a result, found that a satisfactory water resistance of ink in ink jet recording can be obtained when the dry adhering amount of the cationic resin is 0.5-2.0 g/m^2 and a recording paper superior in transferability of toners and running property in electrophotographic recording can be obtained when the surface resistivity is 1.0×10^9 - 9.9×10^{13} Ω.

If the dry adhering amount of the cationic resin is less than 0.5 g/m^2, sufficient water resistance of ink cannot be obtained and if it is more than 2.0 g/m^2, the water resistance of ink is sufficient, but the surface resistivity is lower than 1.0×10^9 Ω to cause deterioration in transferability of toners.

The surface resistivity (unit: Ω) in the present invention is calculated by a calculation formula according to JIS K6911, and, specifically, can be obtained by conducting measurement and calculation using 4329A type high resistance meter and 16008A type resistivity cell (manufactured by Yokogawa Hewlett-Packard Co.) in an atmosphere of 20℃ and 65%RH with a charging time of 30 seconds in accordance with the instruction book for the instruments.

The cationic resins used in the present

invention are monomers, oligomers or polymers of primary - tertiary amines or quaternary ammonium salts which react with sulfonic acid group, carboxyl group, amino group or the like in the direct dyes or acid dyes contained in water-soluble inks to produce insoluble salts, and oligomers or polymers are preferred. Specific examples thereof are dimethylamine·epichlorohydrin polycondensates, acrylamide·diallylamine copolymers, polyvinylamine copolymers, dicyandiamide, dimethyl·diallyl·ammonium chloride, and the like. The cationic resins are not limited to these examples.

Furthermore, in the present invention, it is preferred that cation equivalent of the cationic resins according to colloidal titration method (using potassium polyvinylsulfate, Toluidine Blue) is in the range of 3-8 meq/g. When the cation equivalent is within this range, satisfactory results can be obtained with the above-mentioned range of the dry adhering amount. In the measurement of the cation equivalent by colloidal titration method, the cationic resin is diluted with distilled water to 0.1% in solid content, and adjustment of pH is not conducted.

The surface resistivity of the recording paper in the present invention is 1.0×10^9 - 9.9×10^{13} Ω, preferably 1.0×10^{10} - 9.9×10^{13} Ω. If the surface resistivity is lower than 1.0×10^9, chargeability decreases and, for this reason, transferability of toners is deteriorated, and if it is higher than $9.9 \times$

10^{13}, the chargeability increases to cause scattering of toners or unsatisfactory running property of the recording papers.

Supports of the recording papers of the present invention include papers mainly composed of wood fibers and sheet-like materials such as nonwoven fabrics mainly composed of wood fibers or synthetic fibers. Wood pulps used for papers include, for example, soft wood bleached kraft pulp (NBKP), hard wood bleached kraft pulp (LBKP), soft wood bleached sulfite pulp (NBSP), hard wood bleached sulfite pulp (LBSP), ground wood pulp (GP), thermo-mechanical pulp (TMP) and, besides, waste paper pulp. These are used each alone or in combination as required.

In the case of incorporating waste paper pulp, the proportion of the waste paper pulp in the total pulp is preferably 40% or less for the inhibition of curling which may occur after electrophotographic recording.

As the constituent materials for the waste paper pulp used in the present invention, mention may be made of white shaving paper (johaku), ruled white paper (keihaku), cream white paper (cream johaku), card, special white paper (tokuhaku), medium white paper (chuhaku), flyleaf shaving paper (mozou), fair paper (irojo), Kent paper, white art paper (shiro art), finest cut paper (tokujogiri), special cut paper (betsujogiri), newspaper, magazine paper, etc. which are shown in the standard table for waste paper standard quality supplied

by the Waste Paper Regeneration Acceleration Center Foundation. Typical examples are OA waste papers such as non-coated papers for computers which are information-related papers, papers for printers, e.g., heat-sensitive papers and pressure-sensitive papers, and PPC papers, and waste papers of papers or boards, e.g., coated papers such as art papers, coated papers, slightly coated papers (bitoko papers), and matte papers, and non-coated papers such as woodfree papers, color woodfree papers, notebook papers, letter papers, packing papers, fancy papers, woodcontain papers, newspapers, groundwood papers, supercalendered papers, flyleaf shaving papers, pure white machine glazed papers, and milk cartons, and these waste papers are chemical pulp papers and high yield pulp-containing papers. These are not limited irrespective of printed papers, copied papers, or non-printed papers.

Waste paper pulp is generally produced through combination of the following four steps.

(1) Maceration: Waste papers are treated by mechanical force and chemicals using a pulper to disaggregate them in the form of fibers and to separate ink from the fibers;

(2) Removal of dusts: Foreign matters (such as plastics) and dusts contained in the waste papers are removed by a screen, a cleaner or the like;

(3) Removal of ink: Printing ink separated from fibers with surface active agents are removed out

of the system by floatation method or washing method; and

(4) Bleaching: Whiteness of the fibers is enhanced using oxidizing action or reducing action.

Internal fillers used for the support include known pigments such as white pigment, and these can be used each alone or in combination. Examples of the fillers are white inorganic pigments such as precipitated calcium carbonate, heavy calcium carbonate, kaolin, clay, talc, calcium sulfate, barium sulfate, titanium dioxide, zinc oxide, zinc sulfide, zinc carbonate, satin white, aluminum silicate, diatomaceous earth, calcium silicate, magnesium silicate, synthetic silica, aluminum hydroxide, alumina, lithopone, zeolite, magnesium carbonate and magnesium hydroxide, and organic pigments such as styrene plastic pigments, acrylic plastic pigments, polyethylene, microcapsules, urea resins and melamine resins.

As internal sizing agents used for making the supports in the present invention, there may be used neutral rosin sizing agents used for neutral paper making, alkenyl succinic anhydrides (ASA), alkyl ketene dimers (AKD), petroleum resin sizing agents, and the like, and preferred are neutral rosin sizing agents and alkenyl succinic anhydrides. Alkyl ketene dimers can be used in a small amount because of their high sizing effect, but they cause decrease of friction coefficient of the surface of the recording papers and the recording

papers are apt to slip, and thus they are not preferred from the point of running property in electrophotographic recording.

As methods for adhering the cationic resin to the support, it can be coated on the support by various coating machines such as conventional size press, gate roll size press, film transfer size press, blade coater, rod coater, air knife coater and curtain coater, but from the point of cost, it is desired to adhere the cationic resin by conventional size press, gate roll size press, film transfer size press, etc. which are provided in paper making machines and finish the adhering of the resin on-machine.

In using the cationic resin, generally, a binder is simultaneously used. As the binder, there may be used one or more of oxidized starch, phosphoric acid esterified starch, mill converted starch, e.g., thermo-chemical enzyme converted starch, cationized starch or various modified starches, polyethylene oxide, polyacrylamide, sodium polyacrylate, sodium alginate, hydroxymethyl cellulose, methyl cellulose, polyvinyl alcohol or derivatives thereof.

Furthermore, surface sizing agents can be optionally used for controlling the permeation of ink jet recording inks. As examples thereof, mention may be made of those which have, as a main component, a styrene/acrylic acid copolymer, a styrene/methacrylic acid copolymer, an acrylonitrile/vinyl formal/acrylate

copolymer, a styrene/maleic acid copolymer, an olefin/maleic acid copolymer, an AKD or a rosin. Cationic surface sizing agents are preferred for being used in combination with the cationic resins.

In the present invention, as far as the desired effects of the invention are not damaged, the stock may additionally contain additives such as pigment dispersants, thickening agents, fluidity improving agents, anti-foaming agents, foaming inhibitors, releasing agents, foaming agents, penetrating agents, coloring dyes, coloring pigments, fluorescent brighteners, ultraviolet absorbers, antioxidants, preservatives, mildewproofing agents, water resisting agents, wet strengthening agents, and dry strengthening agents.

As paper making machines used for making the recording papers of the present invention, there may be optionally used known paper making machines such as Fourdrinier paper machine, twin-wire paper machine, combination paper machine, cylinder paper machine and Yankee paper machine.

The present invention will be explained in the following examples. These examples should not be considered to limit the present invention. In the examples, "part" and "%" mean "part by weight" and "% by weight", respectively, unless indicated otherwise.

First, supports 1-4 were prepared according to the following formulations.

<Preparation of support 1>

LBKP (freeness: 450 mlcsf) 100 parts

Precipitated calcium carbonate (trademark: TP-121 manufactured by Okutama Kogyo Co., Ltd.) 10 parts

Aluminum sulfate 1.0 part

Amphoteric starch (trademark: Cato3210 manufactured by Japan NSC Co., Ltd.) 1.0 part

Neutral rosin sizing agent (trademark: NeuSize M-10 manufactured by Harima Kasei Co., Ltd.) 0.3 part

Yield improving agent (trademark: NR-11LS manufactured by Hymo Co., Ltd.) 0.02 part

A 0.3% slurry of the above composition was subjected to paper making by Fourdrinier paper machine to prepare a support of 79 g/m^2 in basis weight.

<Preparation of support 2>

LBKP (freeness: 450 mlcsf) 100 parts

Precipitated calcium carbonate (trademark: TP-121 manufactured by Okutama Kogyo Co., Ltd.) 10 parts

Aluminum sulfate 0.8 part

Amphoteric starch (trademark: Cato3210 manufactured by Japan NSC Co., Ltd.) 1.0 part

ASA sizing agent (trademark: Colopearl Z-100 manufactured by Seiko Kagaku Kogyo Co., Ltd.) 0.1 part

Yield improving agent (trademark: NR-11LS manufactured by Hymo Co., Ltd.) 0.02 part

A 0.3% slurry of the above composition was subjected to paper making by Fourdrinier paper machine

to prepare a support of 79 g/m^2 in basis weight.

<Preparation of support 3>

LBKP (freeness: 450 mlcsf)	100 parts
Precipitated calcium carbonate (trademark: TP-121 manufactured by Okutama Kogyo Co., Ltd.)	10 parts
Aluminum sulfate	0.8 part
Amphoteric starch (trademark: Cato3210 manufactured by Japan NSC Co., Ltd.)	1.0 part
AKD sizing agent (trademark: Sizepine K-903 manufactured by Arakawa Kagaku Kogyo Co., Ltd.)	0.08 part
Yield improving agent (trademark: NR-11LS manufactured by Hymo Co., Ltd.)	0.02 part

A 0.3% slurry of the above composition was subjected to paper making by Fourdrinier paper machine to prepare a support of 79 g/m^2 in basis weight.

<Preparation of support 4>

LBKP (freeness: 450 mlcsf)	60 parts
Flyleaf shaving pulp (freeness: 400 mlcsf)	40 parts
Precipitated calcium carbonate (trademark: TP-121 manufactured by Okutama Kogyo Co., Ltd.)	10 parts
Aluminum sulfate	1.0 part
Amphoteric starch (trademark: Cato3210 manufactured by Japan NSC Co., Ltd.)	1.0 part
Neutral rosin sizing agent (trademark: NeuSize M-10 manufactured by Harima Kasei Co., Ltd.)	0.3 part
Yield improving agent (trademark: NR-11LS manufactured by Hymo Co., Ltd.)	0.02 part

A 0.3% slurry of the above composition was subjected to paper making by Fourdrinier paper machine to prepare a support of 79 g/m^2 in basis weight.

Then, recording papers of examples and comparative examples were prepared by the following methods.

Example 1

To the support 1 prepared above were adhered an oxidized starch (trademark: MS-3800 manufactured by Nippon Shokuhin Kako Co., Ltd.) in a dry adhering amount of 1.2 g/m^2 and a cationic resin (trademark: Hymax SC-700 manufactured by Hymo Co., Ltd., having a cation equivalent of 5.0 meq/g) in a dry adhering amount of 0.5 g/m^2 using a size press apparatus, followed by subjecting to machine calendering treatment to prepare a recording paper of Example 1.

Example 2

A recording paper of Example 2 was prepared in the same manner as in Example 1, except that the dry adhering amount of the cationic resin was 1.2 g/m^2.

Example 3

A recording paper of Example 3 was prepared in the same manner as in Example 1, except that the dry adhering amount of the cationic resin was 2.0 g/m^2.

Example 4

A recording paper of Example 4 was prepared in the same manner as in Example 1, except that the cationic resin used was changed to a cationic resin (trade mark: Polyfix 601 manufactured by Showa Kobunshi Co., Ltd., having a cation equivalent of 7.1 meq/g).

Example 5

A recording paper of Example 5 was prepared in the same manner as in Example 4, except that the dry adhering amount of the cationic resin was 1.2 g/m^2.

Example 6

A recording paper of Example 6 was prepared in the same manner as in Example 4, except that the dry adhering amount of the cationic resin was 2.0 g/m^2.

Example 7

A recording paper of Example 7 was prepared in the same manner as in Example 1, except that the cationic resin used was changed to a cationic resin (trade mark: Sumiraise Resin 1001 manufactured by Sumitomo Chemical Co., Ltd., having a cation equivalent of 3.7 meq/g).

Example 8

A recording paper of Example 8 was prepared in the same manner as in Example 7, except that the dry

adhering amount of the cationic resin was 1.2 g/m^2.

Example 9

A recording paper of Example 9 was prepared in the same manner as in Example 7, except that the dry adhering amount of the cationic resin was 2.0 g/m^2.

Example 10

A recording paper of Example 10 was prepared in the same manner as in Example 4, except that the support 2 was used in place of the support 1.

Example 11

A recording paper of Example 11 was prepared in the same manner as in Example 5, except that the support 2 was used in place of the support 1.

Example 12

A recording paper of Example 12 was prepared in the same manner as in Example 6, except that the support 2 was used in place of the support 1.

Example 13

A recording paper of Example 13 was prepared in the same manner as in Example 4, except that the support 3 was used in place of the support 1.

Example 14

A recording paper of Example 14 was prepared in the same manner as in Example 5, except that the support 3 was used in place of the support 1.

Example 15

A recording paper of Example 15 was prepared in the same manner as in Example 6, except that the support 3 was used in place of the support 1.

Example 16

A recording paper of Example 16 was prepared in the same manner as in Example 4, except that the support 4 was used in place of the support 1.

Example 17

A recording paper of Example 17 was prepared in the same manner as in Example 5, except that the support 4 was used in place of the support 1.

Example 18

A recording paper of Example 18 was prepared in the same manner as in Example 6, except that the support 4 was used in place of the support 1.

Example 19

To both sides of a synthetic paper (trademark: Krisper manufactured by Toyobo Co., Ltd.) as a support

were adhered an oxidized starch (trademark: MS-3800 manufactured by Nippon Shokuhin Kako Co., Ltd.) in a dry adhering amount of 0.6 g/m^2 per one side and a cationic resin (trade mark: Sumiraise Resin 1001 manufactured by Sumitomo Chemical Co., Ltd., having a cation equivalent of 3.7 meq/g) in a dry adhering amount of 0.6 g/m^2 per one side by a rod coater, followed by subjecting to calendering treatment, thereby obtaining a recording paper of Example 19.

Comparative Example 1

A recording paper of Comparative Example 1 was prepared in the same manner as in Example 1, except that the dry adhering amount of the cationic resin was 0.2 g/m^2.

Comparative Example 2

A recording paper of Comparative Example 2 was prepared in the same manner as in Example 1, except that the dry adhering amount of the cationic resin was 3.0 g/m^2.

Comparative Example 3

To both sides of a synthetic paper (trademark: Krisper manufactured by Toyobo Co., Ltd.) as a support were adhered an oxidized starch (trademark: MS-3800 manufactured by Nippon Shokuhin Kako Co., Ltd.) in a dry adhering amount of 0.6 g/m^2 per one side and a cationic

resin (trademark: Sumiraise Resin 1001 manufactured by Sumitomo Chemical Co., Ltd., having a cation equivalent of 3.7 meq/g) in a dry adhering amount of 0.1 g/m^2 per one side by a rod coater, thereby obtaining a recording paper of Comparative Example 3.

Comparative Example 4

A commercially available ink jet recording electrophotographic recording-common paper (trademark: PB manufactured by Canon Sales Co., Ltd.) was used as a recording paper of Comparative Example 4.

Comparative Example 5

A commercially available paper for ink jet and electrophotographic recording (trademark: Multi-Ace manufactured by Fuji Xerox Office Supply Co., Ltd.) was used as a recording paper of Comparative Example 5.

Characteristics of the recording papers of Examples 1-19 and Comparative Examples 1-5 were evaluated by the following methods.

<Surface resistivity>

The surface resistivity (unit: Ω) was measured using a 4329A type high resistance meter and 16008A type resistivity cell (manufactured by Yokogawa Hewlett-Packard Co.) in an atmosphere of 20℃ and 65%RH with a charging time of 30 seconds.

<Water resistance of image>

An image pattern for evaluation was printed using an ink jet color printer BJC-420J manufactured by Canon, Inc. After lapse of 24 hours, a drop of water was let fall on the letter image and the image was left to dry, and, thereafter, degree of spreading of the image was visually judged. Evaluation criteria are as shown below.

A: Good.

B: Good at the practically acceptable level.

C: Practically unacceptable.

D: Bad.

< Transferability of toner>

The image pattern for evaluation was copied using a color copying machine Acolor 935 manufactured by Xerox Corporation, and the transferability of toner was visually judged. Evaluation criteria are as shown below.

A: Good.

B: Good at the practically acceptable level.

C: Practically unacceptable.

D: Bad.

<Running property>

Continuous copying was carried out using recording papers of A4 size by a color copying machine Acolor 935 manufactured by Xerox Corporation, and the running property was judged by the number of occurrence of clogging or running with sticking to each other after

1000 copies were made. Evaluation criteria are as shown below.

A: 0 which is good.

B: 1-5 which is practically acceptable.

C: 6-10 which is problematic at the practically unacceptable level.

D: 11 or more which means bad running property.

Judgement of the transferability of toner and the running property was conducted in an atmosphere of 20℃ and 65%RH as in the measurement of the surface resistivity.

Table 1

Example	Adhering amount of cationic resin (g/m^2)	Surface resistivity (Ω)	Water resistance of image	Transferability of toner	Running property
Example 1	0.5	1.3×10^{10}	A	A	A
Example 2	1.2	6.1×10^{9}	A	B	A
Example 3	2.0	3.4×10^{9}	A	B	A
Example 4	0.5	2.2×10^{10}	A	A	A
Example 5	1.2	1.0×10^{10}	A	A	A
Example 6	2.0	8.0×10^{9}	A	B	A
Example 7	0.5	1.2×10^{11}	B	A	A
Example 8	1.2	8.2×10^{10}	B	A	A
Example 9	2.0	2.7×10^{10}	A	A	A
Example 10	0.5	4.1×10^{10}	A	A	A
Example 11	1.2	2.3×10^{10}	A	A	A
Example 12	2.0	9.5×10^{9}	A	B	A
Example 13	0.5	1.3×10^{10}	A	A	B
Example 14	1.2	9.0×10^{9}	A	B	B
Example 15	2.0	6.5×10^{9}	A	B	B
Example 16	0.5	3.6×10^{10}	A	A	A
Example 17	1.2	1.8×10^{10}	A	A	A
Example 18	2.0	9.1×10^{9}	A	B	A
Example 19	1.2	1.5×10^{13}	B	A	B

Table 2

Comparative Example	Adhering amount of cationic resin (g/m^2)	Surface resistivity (Ω)	Water resistance of image	Transferability of toner	Running property
Comp. Example 1	0.2	8.9×10^{10}	C	A	A
Comp. Example 2	3.0	7.7×10^{9}	A	D	A
Comp. Example 3	0.2	4.6×10^{14}	C	A	D
Comp. Example 4	-	1.2×10^{9}	D	B	A
Comp. Example 5	-	1.7×10^{9}	D	A	A

As is clear from the above results, there were obtained recording papers enhanced in water resistance of images in ink jet recording by adhering to a support 0.5-2.0 g/m^2 (dry adhering amount) of a cationic resin having a cation equivalent of 3-8 meq/g measured by colloidal titration method and excellent in transferability of toners of full color images and satisfactory in running property in electrophotographic recording by giving to the recording papers a surface

resistivity of $1.0 \times 10^9 - 9.9 \times 10^{13}$ Ω, preferably $1.0 \times 10^{10} - 9.9 \times 10^{13}$ Ω.

When AKD sizing agent was used as the internal sizing agent in the support, the running property somewhat deteriorated as compared with when neutral rosin sizing agent or ASA sizing agent was used. It is considered that this is because surface friction coefficient of the recording papers decreased and the recording papers were apt to slip. Furthermore, when a waste paper pulp was used for the support, it can be recognized that it gave no influence on the characteristics and all the characteristics were good.

If the dry adhering amount of the cationic resin is less than 0.5 g/m^2, water resistance of images in ink jet recording was insufficient, and if it is more than 2.0 g/m^2, water resistance of images in ink jet recording was sufficient, but since surface resistivity became lower than 1.0×10^9, the transferability of toners of full color images in electrophotographic recording was deteriorated. Moreover, it can be seen that if the surface resistivity was higher than 9.9×10^{13}, the running property deteriorated.

The ink jet recording electrophotographic recording-common paper of the present invention is excellent in water resistance of images in ink jet recording and has good transferability of toners and good running property in electrophotographic recording

due to the dry adhering amount of the cationic resin of 0.5-2.0 g/m^2 and the surface resitivity of 1.0×10^9 - 9.9×10^{13} Ω.